

WHAT IS CLAIMED IS:

1. A parallel hybrid vehicle comprising:
 - an engine and a drive motor capable of transmitting power to an output shaft;
 - a transmission interposed between the output shaft and the engine;
 - a battery device electrically connected to the drive motor; and
 - a controller configured to:
 - calculate a target driving power in accordance with an operating condition of the vehicle;
 - calculate a fuel consumption rate per power unit at all possible operating points of the engine and drive motor to realize the target driving power;
 - set a target fuel consumption rate on the basis of the vehicle operating condition;
 - search an operating point of the engine and drive motor at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized;
 - when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized has been found, control the engine and drive motor to achieve the operating point; and
 - when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized is not found, correct the fuel consumption rate relating to driving power with only the fuel consumption rate relating to electric power for charging the battery device set at a predetermined value which is smaller than an actual fuel consumption rate, select an operating point at which the fuel consumption rate relating to driving power reaches a minimum, and control the engine and drive motor to achieve the selected operating point.

2. The vehicle as defined in Claim 1, wherein the controller is further configured to stop the engine and drive the vehicle using the drive motor alone when the fuel consumption rate at the selected operating point is larger than the fuel consumption rate when the vehicle is run by the drive motor alone.
3. The vehicle as defined in Claim 1, wherein the predetermined value is larger than the target fuel consumption rate.
4. The vehicle as defined in Claim 1, wherein the predetermined value is equal to the target fuel consumption rate.
5. The vehicle as defined in Claim 1, wherein the controller is further configured to reduce the target fuel consumption rate as storage amount of the battery device increases.
6. A parallel hybrid vehicle comprising:
 - a transmission to which an engine and a motor generator are connected;
 - a drive motor connected to an output shaft of the transmission or a drive shaft of the vehicle;
 - a battery device which is electrically connected to the drive motor and the motor generator; and
 - a controller configured to:
 - calculate a target driving power in accordance with an operating condition of the vehicle;
 - calculate a fuel consumption rate per power unit at all possible operating

points of the engine, motor generator, and drive motor to realize the target driving power;

set a target fuel consumption rate on the basis of the vehicle operating condition;

search an operating point of the engine, motor generator, and drive motor at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized;

when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized has been found, control the engine, motor generator, and drive motor to achieve the operating point; and

when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized is not found, correct the fuel consumption rate relating to driving power with only the fuel consumption rate relating to electric power for charging the battery device set at a predetermined value which is smaller than an actual fuel consumption rate, select an operating point at which the fuel consumption rate relating to driving power reaches a minimum, and control the engine, motor generator, and drive motor to achieve the selected operating point.

7. The vehicle as defined in Claim 6, wherein the controller is further configured to stop the engine and drive the vehicle using the drive motor alone when the fuel consumption rate at the selected operating point is larger than the fuel consumption rate when the vehicle is run by the drive motor alone.

8. The vehicle as defined in Claim 6, wherein the transmission is a planetary gear set comprising a sun gear, a carrier, and a ring gear, and

the engine, motor generator, and drive motor are connected to the sun gear, carrier, and ring gear respectively.

9. The vehicle as defined in Claim 6, wherein the predetermined value is larger than the target fuel consumption rate.

10. The vehicle as defined in Claim 6, wherein the predetermined value is equal to the target fuel consumption rate.

11. The vehicle as defined in Claim 6, wherein the controller is further configured to reduce the target fuel consumption rate as storage amount of the battery device increases.

12. A parallel hybrid vehicle comprising:

a motor generator connected to an engine;

a battery device for storing electric power generated by the motor generator;

and

a controller configured to:

calculate a fuel consumption rate per charging power unit at all possible operating points of the engine and motor generator when the vehicle is stationary;

set a target fuel consumption rate on the basis of an operating condition of the vehicle;

search an operating point of the engine and motor generator at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized;

when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized has been found, control the engine

and motor generator to achieve the operating point; and

when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized is not found, determine a fuel consumption rate for realizing each operating point with the fuel consumption rate relating to the charging power at each operating point set at a predetermined value which is smaller than an actual fuel consumption rate, select an operating point at which the fuel consumption rate reaches a minimum, and control the engine and motor generator to achieve the selected operating point.

13. The vehicle as defined in Claim 12, wherein the predetermined value is larger than the target fuel consumption rate.

14. The vehicle as defined in Claim 12, wherein the predetermined value is equal to the target fuel consumption rate.

15. The vehicle as defined in Claim 12, wherein the controller is further configured to reduce the target fuel consumption rate as storage amount of the battery device increases.

16. A parallel hybrid vehicle comprising:

an engine and a drive motor capable of transmitting power to an output shaft;

a transmission interposed between the output shaft and the engine;

a battery device electrically connected to the drive motor;

means for calculating a target driving power in accordance with an operating condition of the vehicle;

means for calculating a fuel consumption rate per power unit at all possible

operating points of the engine and drive motor to realize the target driving power;

means for setting a target fuel consumption rate on the basis of the vehicle operating condition;

means for searching an operating point of the engine and drive motor at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized;

means for, when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized has been found, controlling the engine and drive motor to achieve the operating point; and

means for, when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized is not found, correcting the fuel consumption rate relating to driving power with only the fuel consumption rate relating to electric power for charging the battery device set at a predetermined value which is smaller than an actual fuel consumption rate, selecting an operating point at which the fuel consumption rate relating to driving power reaches a minimum, and controlling the engine and drive motor to achieve the selected operating point.

17. A parallel hybrid vehicle comprising:

a transmission to which an engine and a motor generator are connected;

a drive motor connected to an output shaft of the transmission or a drive shaft of the vehicle;

a battery device which is electrically connected to the drive motor and the motor generator;

means for calculating a target driving power in accordance with an operating condition of the vehicle;

means for calculating a fuel consumption rate per power unit at all possible operating points of the engine, motor generator, and drive motor to realize the target driving power;

means for setting a target fuel consumption rate on the basis of the vehicle operating condition;

means for searching an operating point of the engine, motor generator, and drive motor at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized;

means for, when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized has been found, controlling the engine, motor generator, and drive motor to achieve the operating point; and

means for, when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized is not found, correcting the fuel consumption rate relating to driving power with only the fuel consumption rate relating to electric power for charging the battery device set at a predetermined value which is smaller than an actual fuel consumption rate, selecting an operating point at which the fuel consumption rate relating to driving power reaches a minimum, and controlling the engine, motor generator, and drive motor to achieve the selected operating point.

18. A parallel hybrid vehicle comprising:

a motor generator connected to an engine;

a battery device for storing electric power generated by the motor generator;

means for calculating a fuel consumption rate per charging power unit at all possible operating points of the engine and motor generator when the vehicle is

stationary;

means for setting a target fuel consumption rate on the basis of an operating condition of the vehicle;

means for searching an operating point of the engine and motor generator at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized;

means for, when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized has been found, controlling the engine and motor generator to achieve the operating point; and

means for, when an operating point at which a fuel consumption rate that is equal to the target fuel consumption rate can be realized is not found, determining a fuel consumption rate for realizing each operating point with the fuel consumption rate relating to the charging power at each operating point set at a predetermined value which is smaller than an actual fuel consumption rate, selecting an operating point at which the fuel consumption rate reaches a minimum, and controlling the engine and motor generator to achieve the selected operating point.